

A Taxonomic Study on Marine Sponges from Ulleungdo Island, Korea

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ABSTRACT

A taxonomic study on the marine sponges was conducted with material collected by SCUBA diving from Ulleungdo Island, Korea during July 2001 to August 2003. They were identified 19 species belonging to 14 genera in 12 families of six orders in two classes identified. Among them, *Haliclona (Reniera) permollisimilis* Hoshino, 1981 is newly recorded to the Korean fauna and *Geodia ulleungensis* n. sp. is new to science.

Key words: taxonomy, marine sponge, Ulleungdo Island, Korea

INTRODUCTION

Ulleungdo Island is a unique island in the East Sea of Korea. This island belongs to the administrative district of Ulleung-gun, Gyeongsangbuk-do. Its geographical position is 130°55'E, 37°33'N, 217 km away from Pohang, Gyeongsangbuk-do, Korea.

Sponges from Ulleungdo Island are not well known so far. Only eight species, *Dactylella higendorfi* Thiele, 1898, *Geodinella cylindrica* Thiele, 1898, *Haliclona ulleungia* Sim and Byeon, 1989, *Leucandra multituba* Hozawa, 1929, *Raspailia villosa* Thiele, 1898, *Stelletta calyx* Sim and Kim, 2003, *Mycale (Naviculina) ulleungensis* Sim and Kang, 2004 and *Mycale (Naviculina) neunggulensis* Sim and Kang, 2004, have been reported from this island (Rho and Sim, 1979; Sim, 1981, 1982; Sim and Byeon, 1989; Sim and Kim, 2003; Sim and Kang, 2004). It is difficult to

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collect the sponges from this Island, because Ulleungdo Island has only about 54 fine days per year.

The materials examined in this study were collected from Ulleungdo Island and its adjacent waters by SCUBA diving (5-40 m deep) from July 2001 to August 2003 (Fig. 1). As a result, 19 species belonging to 14 genera in 12 families of six orders in two classes were found on Ulleungdo Island. Of which, *Haliclona (Reniera) permollisimilis* (Hoshino, 1981) is newly recorded to the Korean fauna, and *Geodia ulleungensis* n. sp. is new to science.

The identification has been done on the basis of the external features, shape, skeletal structure, and size and form of spicules. The thin free-hand section was made by hardening the specimen in alcohol and cutting the section with a surgical blade in order to observe the structure of the skeleton. Spicules were prepared by dissolving a piece of sponge in sodium hypochlorite and were examined with SEM (Scanning Electron Microscope, HITACHI S-3000N) using the procedure of Rutzler (1978). The holotype is deposited in the Natural History Museum, Hannam University (HUNHM), Daejeon, Korea.

SYSTEMATIC ACCOUNTS

Phylum Porifera Grant, 1836

Class Demospongia Sollas, 1885

Subclass Tetractinomorpha Levi, 1956

Order Astrophorida Levi, 1973

Family Ancorinidae Schmidt, 1870

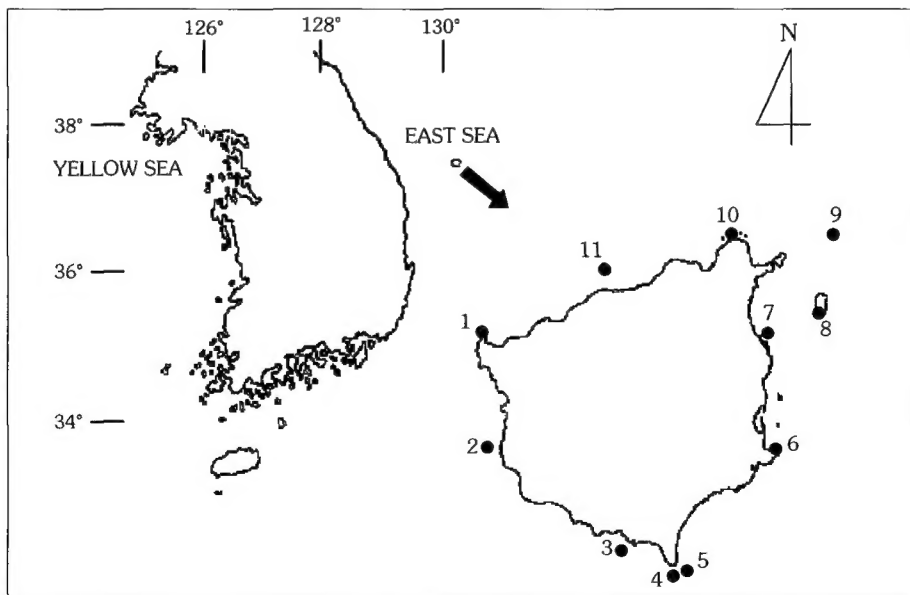


Fig. 1. A map marking the localities where the examined material were collected. 1, Daepungryeong; 2, Malbawui; 3, Geobukbawui; 4, Neunggul; 5, Gadubong; 6, Haengnam lighthouse; 7, Bukjeobawui; 8, Jukdo; 9, Ssangjungcho; 10, Ilsunam; 11, Gongam.

1. *Stelletta calyx* Sim and Kim, 2003**Previous record.** Ulleungdo Island (Sim and Kim, 2003).**Material examined.** Haengnam lighthouse, 31 July 2001; Neunggul, 2 Aug. 2001; Gadubong, 2 Aug. 2001; Ssangjungcho, 27 Aug. 2003.**Distribution.** Korea (Ulleungdo Island).

Family Geodiidae Gray, 1867

2. *Geodia cylindrica* (Thiele, 1898)**Previous record.** Ulleungdo Island (Sim, 1982).**Distribution.** Korea (Ulleungdo Island), Japan (Sagami Bay, Enoshima).**3. **Geodia ulleungensis* n. sp. (Figs. 2-3)****Type specimens.** Holotype (Por. 48). Bukgeobawui, 31 July 2001, SCUBA, 25 m deep, K. J. Lee, deposited in the HUNHM, Daejeon, Korea. Paratypes. Por. 47-1, Haengnam lighthouse, 31 July 2001, SCUBA 25 m deep, K. J. Lee. Por. 47-2, Daepungryung, 24 Oct. 2001, 18 June 2002, SCUBA 20 m deep, K. J. Lee, deposited in the Department of Biology, Hannam University, Daejeon, Korea.**Description.** Holotype, massive form. Size up to 13×6 cm in wide and 7.5 cm in thick. Paratypes, massive or globular sponges. Surface smooth. Oscules and pores invisible. Texture hard like stone, Color in life, light brown and ivory partly in ectosome and ivory in endosome. Preserved specimen changed to ivory. Cortex 100 µm in thick. Sterraster and oxyasters dispersed within the crust of choanosome. Orthotriaenes extend their cladome within the inner layer of the cortex and direct rhabdome toward choanosome. Oxea, irregularly scattered in endosome.**Spicules.** Megascleres: Large oxeas straight or slightly curved; small oxeas straight; orthotriaenes tapering to sharp point and cladome curved to outwards; thin anatriaenes easily broken and rare. Microscleres: Sterrasters, subspherical form with diverse short actines; spherasters with a marked centrum and conical, pointed actines; oxyaster has rough and conical actines; acanthostrongylasters rare.

Megascleres

| | |
|---------------------|------------------------|
| large oxeas | 800-2,200 × 15-40 µm |
| small oxeas | 150-240 × 2-6 µm |
| orthotriaenes | 1,140-1,800 × 15-45 µm |
| anatriaenes | 1,800-3,200 × 10-20 µm |

Microscleres

| | |
|-----------------------------|----------|
| Sterrasters | 50-80 µm |
| Oxyasters | 25 µm |
| spherasters | 15 µm |
| acanthostrongylasters | 5 µm |

Etymology. This species is named after its type locality, Ulleungdo Island, Korea.**Remarks.** This new species has a close resemblance to *Geodia reniformis* Thiele, 1898 base on the

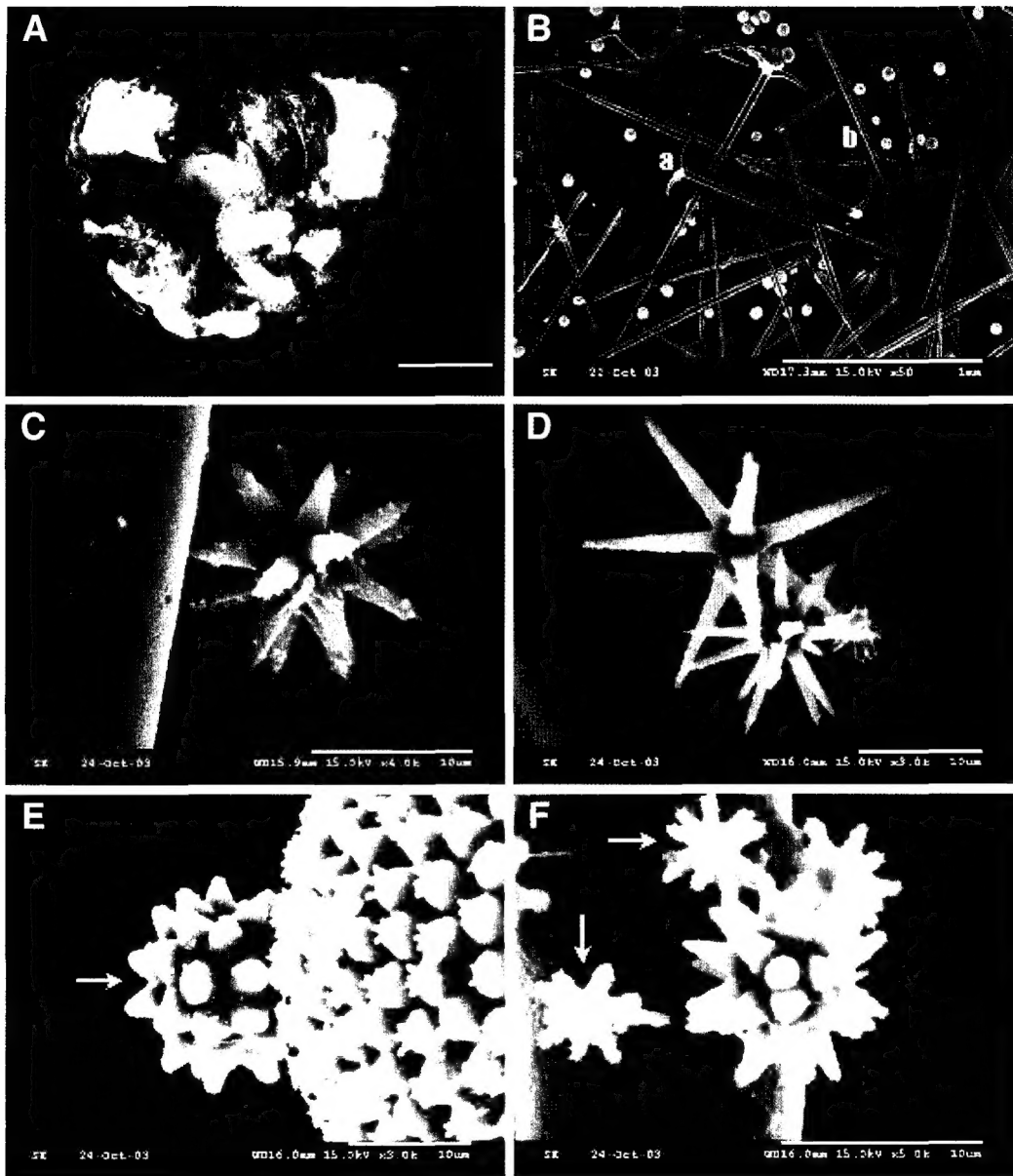


Fig. 2. *Geodia ulleungensis* n. sp. A, entire animal; B, large oxea (a) and orthotriaene (b); C, oxyaster; D, oxyasters; E, spheraster (arrow); F, acanthostrongylasters (arrows). Scale bars = 10 μ m (C-F), 1 mm (B), 3 cm (A).

growth form and color. However, it differs from *G. reniformis* by the size of megascleres and the shape of sterrasters. Moreover, its oxeas and triaenes are shorter than those of *G. reniformis* and its conical actines of sterrasters are very diverse.

Order Hadromerida Topsent, 1894

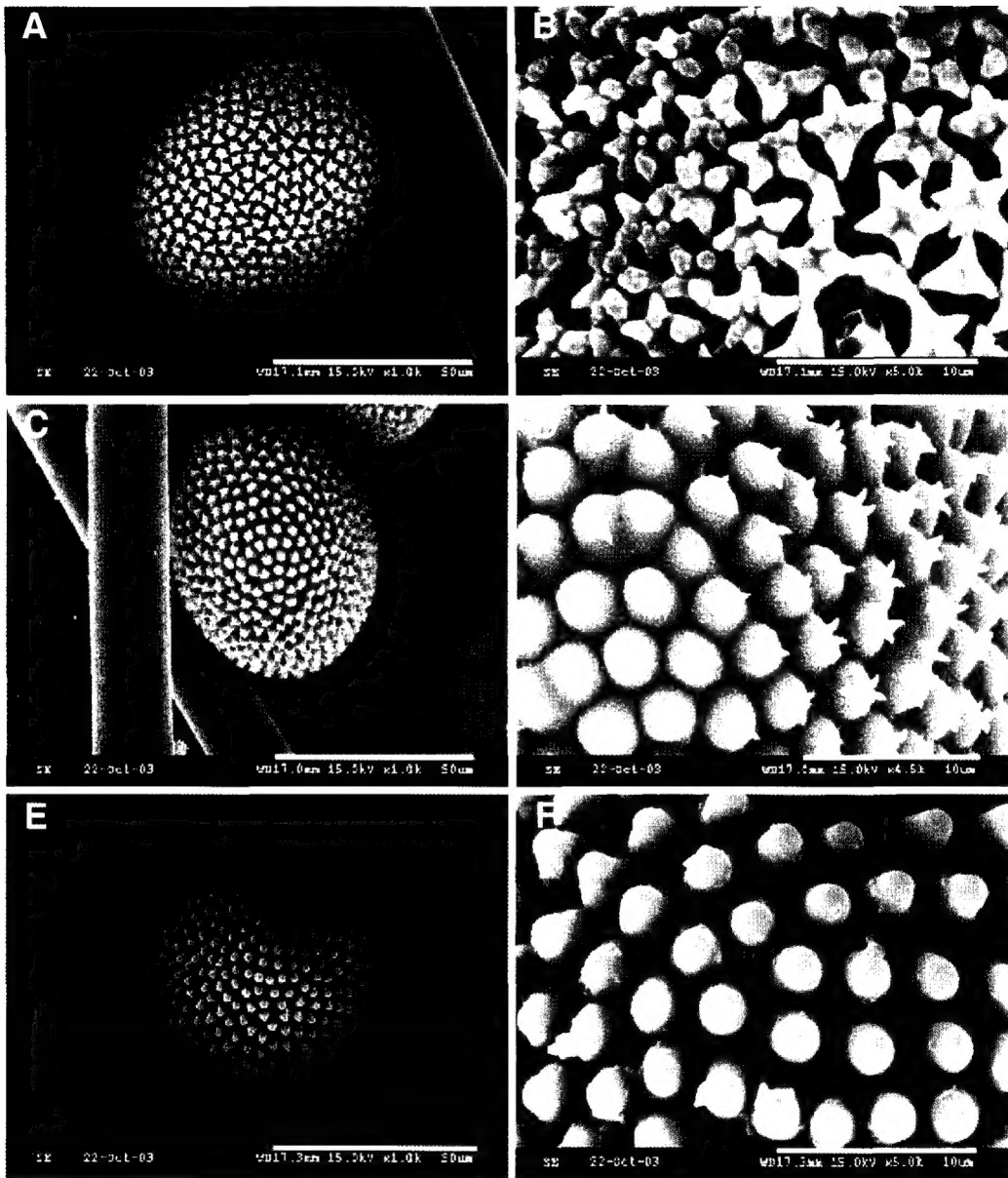


Fig. 3. *Geodia ulleungensis* n. sp. A-F, sterrasters: A, sterraster; B, cornical actines of sterraster of A; C, sterraster; D, cornical actines of sterraster of C; E, sterraster; F, cornical actines of sterraster of E. Scale bars = 10 µm (B, D, F), 50 µm (A, C, E).

Family Clionaidae D'Orbigny, 1851

4. *Cliona celata* Grant, 1826

Material examined. Neunggul, 23 Oct. 2001; Ssangjungcho, 27 Aug. 2003.

Distribution. Korea (East Sea, Korea Strait, South Sea, Jeju Island, Yellow Sea); Pacific Coast of

North America; Gulf of St. Lawrence to South Carolina; Gulf Coast of Louisiana and Texas.

Family Polymastiidae Gray, 1867

5. *Polymastia murrayi* Burton, 1959

Material examined. Gadubong, 2 Aug. 2001.

Distribution. Korea (East Sea, Yellow Sea); Maldives area; Gulf of Aden.

Family Suberitidae Schmidt, 1870

6. *Suberites japonicus* Thiele, 1898

Material examined. Geobukbawui, 2 Aug. 2001; Gadubong, 2 Aug. 2001, 19 June 2002; Neunggul, 23 Oct. 2001.

Distribution. Korea (East Sea, Korea Strait, Yellow Sea); Japan (Sado Island).

Order Poecilosclerida Topsent, 1928

Suborder Microcionina Hajdu et al., 1994

Family Raspailiidae Hentschel, 1923

7. *Raspailia villosa* Thiele, 1898

Previous record. Ulleungdo Island (Sim, 1981)

Distribution. Korea (East Sea); Japan (Hakodate).

Suborder Myxillina Hajdu et al., 1994

Family Myxillidae Topset, 1928

8. *Myxilla setoensis* Tanita, 1961

Material examined. Daepungryeong, 31 July 2001; Haengnam lighthouse, 31 July 2001; Jukdo, 1 Aug. 2001, 25 Aug. 2003; Neunggul, 23 Oct. 2001, 29 Aug. 2003; Ssangjungcho, 27 Aug. 2003.

Distribution. Korea (East Sea, Korea Strait, Yellow Sea); Japan (Sado Island).

9. *Myxilla rosacea* Lieberkuhn, 1859

Material examined. Haengnam lighthouse, 31 July 2001; Bukjeobawui, 31 July 2001.

Distribution. Korea (South Sea, Yellow Sea); Japan.

Suborder Mycalina Hajdu et al., 1994

Family Mycalidae Lundbeck, 1905

10. *Mycale (Naviculina) ulleungensis* Sim and Kang, 2004

Previous record. Ulleungdo Island (Sim and Kang, 2004)

Distribution. Korea (East Sea).

11. **Mycale (Naviculina) neunggulensis* Sim and Kang, 2004

Previous record. Ulleungdo Island (Sim and Kang, 2004)

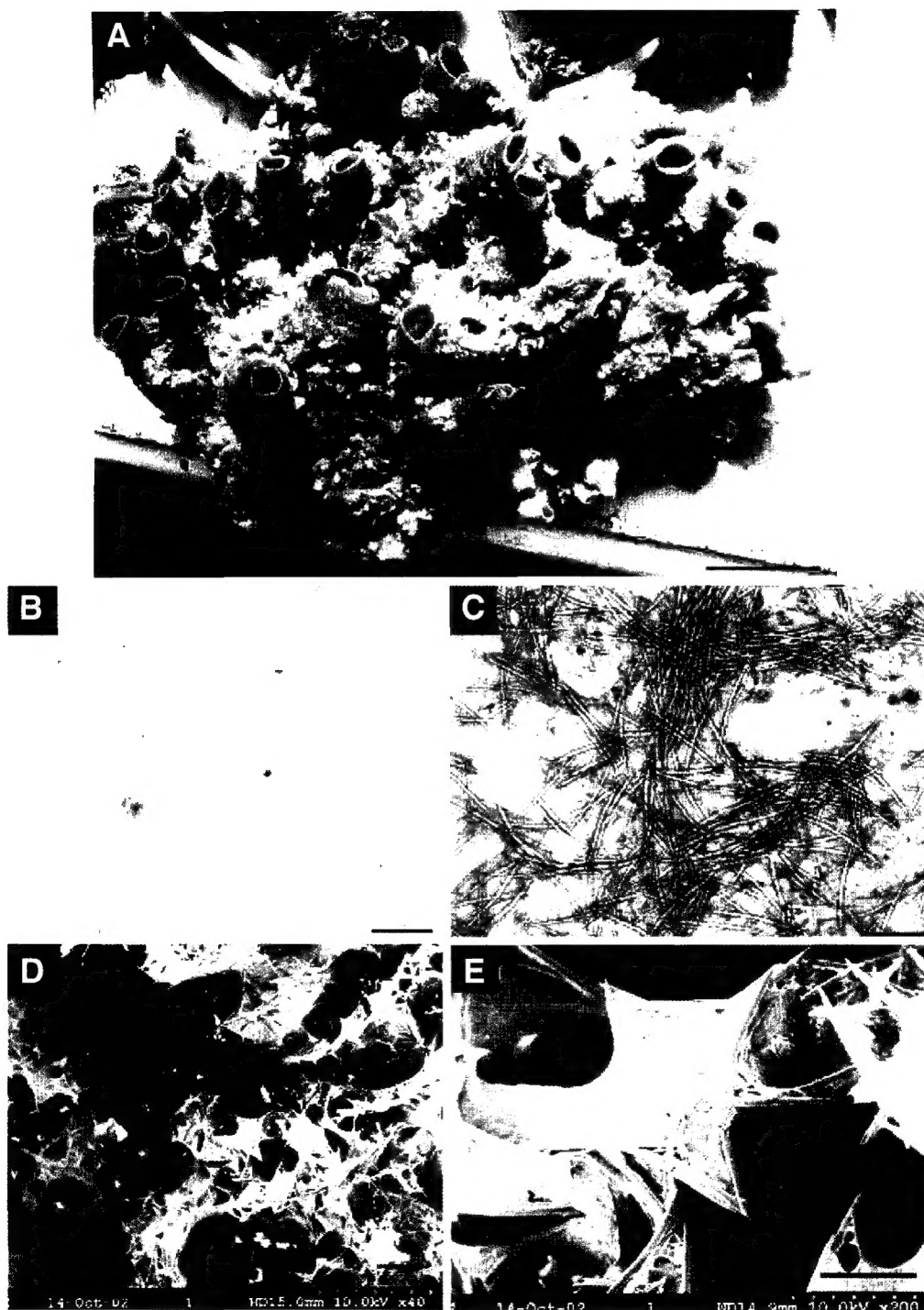


Fig. 4. *Haliclona (Reniera) permollisimilis* (Hoshino, 1981). A, entire animal; B, oxeas; C, ectosomal skeleton; D, endosomal skeleton; E, subisodictyal skeletal structure of endosome. Scale bars = 100 μm (B, C, E) 200 μm (D), 2 cm (A).

Distribution. Korea (East Sea).

Suborder Latunculina Hooper & Soest, 2002

Family Latrunculiidae Topsent, 1922

12. *Latrunculia ikematsui* Tanita, 1968

Material examined. Neunggul, 26 Aug. 2003.

Distribution. Korea (Korean Strait, Gageo Island, Ulleungdo Island); Japan.

Order Halichondrida Gray, 1867

Family Dictyonellidae Van Soest et al., 1990

13. *Acanthella vulgata* Thiele, 1899

Material examined. Geobukbawui, 2 Aug. 2001.

Distribution. Korea (East Sea, Korea Strait); Japan.

14. *Lipastrotethya hilgendorfi* (Thiele, 1898)

Previous record. Ulleungdo Island (Sim, 1982)

Distribution. Korea (East Sea, Korea Strait); Japan (Sado Island)

Order Haplosclerida Topsent, 1928

Suborder Haplosclerina Topsent, 1928

Family Chalinidae Gray, 1867

15. *Haliclona (Reniera) surrufa* Hoshino, 1981

Material examined. Haengnam lighthouse, 31 July 2001; Gadubong, 2 Aug. 2001.

Distribution. Korea (East Sea, South Sea); Japan.

16. *Haliclona (Reniera) densaspicula* (Hoshino, 1981)

Material examined. Gongam, 28 July, 2001; Haengnam lighthouse, 31 July 2001; Bukjeobawui, 31 July 2001; Gadubong, 2 Aug. 2001; Jukdo, 2 Aug. 2001.

Distribution. Korea (East Sea, South Sea); Japan.

17. **Haliclona (Reniera) permollisimilis* (Hoshino, 1981) (Fig. 4A-E)

Haliclona (Reniclona) permollisimilis Hoshino, 1981, p. 80, fig. 20; pl. 2, fig. 9.

Material examined. Daepungryeong, 28 July 2001; Malbawui, 28 July 2001.

Description. Irregular and thickly encrusting, up to 4 cm thick, with protruded tube. Surface uneven. Oscules, 6-15 mm in diameter, opened on top of tube. Texture soft and slightly compressible. Color purple in life. Ectosome has no dermal membrane. Endosome irregularly and loosely composed of one to several rows of oxea. Spicules, oxea only, smooth and slightly bent at middle with each end tapering to a point.

Spicules.

Oxeas 160-190 × 10 μm

Remarks. This species slightly different with the specimen of Hoshino (1981) in spicules size, but other characters are similar to Hoshino's specimen.

Distribution. Korea (East Sea); Japan.

18. *Haliclona ulreungia* Sim and Byeon, 1989

Previously record. Ulleungdo Island (Sim and Byeon, 1989).

Distribution. Korea (East Sea).

Class Calcarea Bowerbank, 1864

Order Sycettida Dendy, 1892

Family Grantiidae Dendy, 1892

19. *Leucandra multitube* Hozawa, 1929

Previously record. Ulleungdo Island (Rho and Sim, 1979).

Distribution. Korea (East Sea); Japan.

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REFERENCES

- Hooper, J. N. A. and W. M. van Soest, 2002. *Systema Porifera: A guide to the classification of sponges*. Kluwer Academic/Plenum Publishers Press, USA, pp 681-682.
- Hoshino, T., 1981. Shallow-Water Demosponges of Western Japan, 1. J. Sci. Hiroshima Univ. Ser. B. Div., **29**(1): 47-205.
- Lerner, C. and E. Hajdu, 2002. Two new *Mycale* (*Naviculina*) Gray (Mycalidae, Poecilosclerida, Demospongiae) from the Paulista Biogeographic Province (Southwestern Atlantic). *Revta Bras. Zool.*, **19**(1): 109-122.
- Rho, B. J. and C. J. Sim, 1979. A taxonomic study on the Korean sponges 1. Poecilosclerina. J. Korean Res. Inst. Bot. Liv., Ewha Woman's Univ., **23**: 61-67.
- Rützler, K., 1978. Sponges in coral reefs. *Monogr. Oceanogr. Neth.*, **5**: 299-313.
- Sim, C. J., 1981. A systematic study on the marine sponges in Korea. Soongjun Univ., Essays Pap., **11**: 83-105.
- Sim, C. J., 1982. A systematic study on the marine sponges from Jeju Island. J. Korean Res. Inst. Bot. Liv., Ewha Woman's Univ., **12**: 187-210.
- Sim, C. J. and H. S. Byeon, 1989. A systematic study on the marine sponges in Korea 9. Ceractinomorpha. *Korean J. Syst. Zool.*, **5**(1): 33-57.
- Sim, C. J. and D. W. Kang, 2004. Two new species of the genus *Mycale* (*Naviculina*) (Poecilosclerida: Mycalidae) from Ulleungdo Island, Korea. *Korean J. Biol. Sci.*, **8**(2): 71-75.
- Sim, C. J. and Y. A. Kim, 2003. Two new sponge species of the genus *Stelletta* (Astrophorida: Ancorinidae)

from Korea. Korean J. Biol. Sci., **7**: 25-28

Sim, C. J. and K. J. Lee, 2001. Two new species of the genus *Mycale* (Poecilosclerida: Mycalidae) from Korea. Korean J. Biol. Sci., **5**: 25-29.

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울릉도 해산 해면류의 분류학적 연구

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요 약

울릉도 해산 해면류를 동정·분류하기 위하여 2001년 7월부터 2003년 8월까지 울릉도 인근 지역 섬으로부터 SCUBA를 이용하여 채집한 표본을 동정하였다. 그 결과 2강 6목 12과 14속 19종으로 밝혀졌고, 이 가운데 유사보라해면 [*Haliclona* (*Reniera*) *permollisimilis* (Hoshino, 1981)]이 한국미기록종으로 밝혀졌으며 울릉조디아해면 (*Geodia ulleungensis* n. sp.)이 신종으로 밝혀졌다.